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Michelin rolling out new electronics technology

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Before too much longer, tires could be talking -- initially to car makers and perhaps tire dealers, but eventually to consumers.

Michelin North America has designed a radio frequency transponder that can be manufactured into the tire, storing essential information and making it available to car or tire makers. The device will last for the life of a tire, said George O'Brien, North American electronics research director and global project leader.

Terry Gettys, president of Michelin North America's Research and Development Corp., said, "We see great promise in this technology. In future generations, the electronics in tires will be able to communicate with the vehicle's computers, giving information about tire pressure, even ride characteristics like suspension stiffness and ride comfort for a given road surface."

Dave Adamson, Michelin electronic concepts engineer, foresees a time when the date and time of tire rotation or even the schedule for a car's oil changes could be included on the transponder.

The device "is extremely significant," said Morris Brown, the Automotive Industry Action Group's program manager for materials management. "You're talking about tracking an item through its entire life."

Tires incorporating the transponder are now being tested by fleet vehicles, O'Brien said.

Also, a major car maker currently is interested in the concept and is talking with Michelin, he said, declining to name the company. These tires could be on 2005 model cars, with Michelin beginning production around the end of next year.

Costs for a tire with the new technology will be a "few dollars" more -- less than \$5 -- but the cost will decrease as the volume of tires increases, O'Brien said.

Michelin's invention also means consumers "should have a little extra security," he said. Companies "can be very focused. You don't have everybody panicking" if a recall occurs.

Currently, information is imprinted on the side of a tire, making it inconvenient for a person to read it.

"Sometimes you have to crawl under a vehicle with a flashlight to get the DOT (Department of Transportation) information," said O'Brien.

Since the 1980s, a bar code has been used on tires. That information cannot be changed or added to, and the bar code degrades over time, he said.

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The electronic device, on the inside of the tire, is not visible and is not harmed by the wear of a tire, he said.

Michelin spent two years researching the electronic transponder -- an integrated circuit about the size of a match head with an antennae with identification information with on-the-shelf equipment, O'Brien said. The integrated circuit is manufactured by Fairchild Semiconductor and Philips, but the transponder itself is Michelin's intellectual property.

Adamson said transponders now hold 110 characters and one now in pre-production holds 238 characters. That could double again in the next year or so.

A device reads the information when pointed at the tire, and humans read the information from the transponder on a computer, making it easier for car and tire manufacturers to comply with federal record-keeping requirements. Information such as that required by DOT could be "locked" so it couldn't be changed, but additional changeable information can also be written to the transponder, O'Brien said.

Initially designed for original equipment tires put on new cars, the information on the transponder includes the manufacturing facility, the week of manufacture, the size of the tire and the tire reaction to the car, Adamson said. Also to be included would be the vehicle identification number.

If consumers like the security, the transponder could be added to tires made for the replacement market -- much larger than the original equipment market, Adamson said. Brown said he expects that to happen.

Although other tire companies also conducting research on this type of technology, Michelin's transponder is the first radio frequency identification device to be approved by AGIG, a group of about 1,500 member companies made up of car makers and suppliers, he said.

The technology has been offered for sale to other tire makers, who are now conducting tests on it, in the attempt to create a standard technology, O'Brien said.

"We want the public to be able to use the information quickly," he said. "Every time a solution is developed, it costs money. Multiple standards are enormously expensive."

The device was demonstrated in Germany last year. One person said he didn't believe the device would last through repeated scrubbing against curbs. "We ran it against curbs, over curbs, through curbs until the clutch was smoking," Adamson said. "The transponder always worked."

The transponder recently debuted at the North American International Automobile Show along with Michelin's PAX system run-flat tire.

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APPENDIX B

RFID JOURNAL

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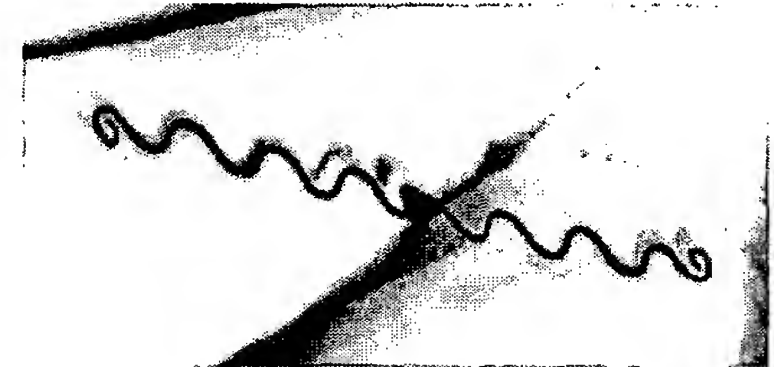
Michelin Embeds RFID Tags in Tires

The tire maker has begun testing a UHF transponder that it adapted for use inside rubber sidewalls.

Jan 17, 2003 - Michelin this week revealed that it has begun fleet testing of an RFID transponder embedded in its tires to enable them to be tracked electronically. After it completes testing, which will likely last 18 months, Michelin will begin offering automakers the option of purchasing tires with embedded transponders.

The US Congress passed the TREAD (Transportation, Recall, Enhancement, Accountability and Documentation) Act in the wake of the Firestone/Ford Explorer debacle. The act mandates that car makers closely track tires from the 2004 model year on, so they can be recalled if there's a problem. This technology could be available for the 2005 model year.

Michelin hopes manufacturers will pay a little more for tires with RFID transponders, because it makes the tires easier to track. The microchip stores the tire's unique ID, which can be associated with the vehicle identification number. The chip can also store information about when and where the tire was made, its maximum inflation pressure, size and so on. Information can be updated with a handheld reader.



Michelin's RFID tag

Other tire makers have demonstrated the ability to read RFID transponders embedded in tires. But Michelin claims to be the first to meet the Automotive Industry Action Group's B-11 standard for North America, which calls for a read distance of 24 inches. Achieving that range has been a challenge because the rubber makes it harder to read the tag.

When Michelin took off-the-shelf, passive UHF transponders and embedded them in tires, the read distance dropped to less than three inches, according to George O'Brien, Michelin's North American technical director for electronic products and services. To boost the read range, the company took microchips from Fairchild Semiconductor and Philips Semiconductor and designed its own special antenna.

O'Brien would not reveal details, but he said the antenna was designed to compensate for the fact that electromagnetic waves travel differently through rubber than through air. He said the transponder that his team designed loses only 10 percent of its read range when it is embedded in a tire.

The other key issue was to ensure that the rubber bonds to the antenna. Michelin developed a proprietary coating it puts on the transponders before putting them into the rubber. "The most important concern is making sure the tire is not compromised in any way," O'Brien says. "You have to make sure the rubber bonds carefully to antenna so the wire that the antenna is made from doesn't break and then work its way out of the sidewall of the tire."

The tire is now being tested in several areas of the country by taxi and rental car fleets. Michelin says the transponders cost "several dollars" today, but the price will drop if they are manufactured in mass volumes (Michelin manufactures more than 800,000 tires a day). It's not clear yet whether automakers will be willing to pay the additional cost.

The Fairchild and Philips chips are based on Intermec's Intellitag. Saleem Miyan, Philips global strategic business manager for RFID products, says his company made some refinements to the Intellitag design, which it has licensed from Intermec. The Philips I-Code HSL chip operates at 868-915 MHz stores about 2 kilobytes of information. It is currently available only in sample quantities. It will be mass-produced starting in the middle of the year.

Philips and Texas Instruments have also developed pressure and temperature sensors that use battery-powered RFID tags to communicate with a reader in the dashboard. That enables the driver to know when the pressure of one particular tire drops below a certain level (see RFID Chip To Monitor Tire Pressure). The Michelin transponder is strictly for identification and tracking.

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